Choosing Between Suction & Pressure- Rocket Science?

by Jed Heastrup, Sales Manager, Clemco Industries Corp, ZERO & AEROLYTE brands

When solving a perplexing blast equipment problem here at Clemco, we often joke with one another that blasting is not, after all, rocket science. Yet sometimes it seems so. Take, for example, making the decision to suction blast or pressure blast for your application. Blasting is commonly considered 'low tech' in its most basic form; but the complexity associated with what may appear to be a simple economic decision is astounding. Especially these days, you are probably carefully evaluating every capital expenditure. Your investment decision for blasting equipment involves evaluation of the upfront expense, the operating costs for labor and materials, and the costs associated with ongoing maintenance to keep the equipment performing at its best so that your output continues at optimum levels and you make the most of your investment.

Suction blast systems use the induction principle for drawing media from a non-pressurized reservoir. One hose carries media, the other delivers compressed air to the blast gun where the air passing at high velocity through the air jet draws media into the gun where it exits through a nozzle. With a 3/16" air jet and a 3/8" nozzle, the system consumes 47.5 cfm of air when blasting at 80 psi.

Pressure blast systems hold media in a pressure vessel. When the vessel is pressurized with compressed air, media is gravity fed through a metering valve into the blast hose. Air and media flow at high velocity through the hose and exit through a nozzle. Using a 3/8" pressure blast nozzle consumes 161 cfm of air when blasting at 80 psi.

An obvious difference between the two systems in terms of economic impact is air consumption. Providing compressed air costs money – the more air consumed, the higher the expense. Another difference is the size of the enclosure that is appropriate for your application. The size of the enclosure depends upon the size of the parts to be blasted; in suction blasting, the gun is held relatively close to the part because media velocity is low compared with pressure blasting where the stand-off distance must be greater to take advantage of the increased power generated by greater media velocity. In blast cleaning applications, pressure blasting can improve production from 300% to 400% over suction blasting. But, the higher velocity and greater air volume also can contribute to more rapid operator fatigue.

Your selection of suction or pressure foremost involves your application. Suction blasting is best for thin or delicate substrates as the higher velocities of pressure blasting can deform such an object. Small parts are hard to hold and are usually best processed with a suction system because the velocity associated with suction blasting is gentler on the gloved hand. Pressure blasting into your glove destroys the glove in seconds. Of course, blasting directly into your glove even with suction eventually wears out the glove.

Processing larger parts, removing durable coatings or heavy corrosion, or requiring deeper surface profiles for coating, plating or bonding call for a pressure system. Pressure is also best for blasting small, deep holes or recesses where the velocity of suction blasting is insufficient.

As you can see, your application is the key to your decision– pressure blasting is desirable when

your application can benefit from the increased power generated by higher velocity.

A word of caution: In shot peening applications, your criteria for choosing between pressure and suction are altogether different. Shot peening is a stricter science. Shot peening operations usually must comply with a written specification to ensure exacting results. The specification will address requirements such as area of coverage, peening intensity, and size and type of media. Suction systems can achieve desired results up to certain shot sizes, beyond which pressure blast systems will deliver more consistent performance. Due to the critical nature of shot peening results, every shot peening operation must be carefully controlled to ensure repeatability. It is advisable to check all applicable specifications and job requirements before making shot peening equipment decisions.

Today, economic, environmental, and safety concerns drive choices businesses must make every day about production processes. Blast cleaning can help you to avoid the hazards associated with using chemicals and disposing of them. Blasting also can improve the structural integrity of your finished product as it improves its performance or appearance. Without doubt, the applications for blasting are infinite.

Making your decision about the best system for your application involves many factors and many trade-offs. Blast cabinets are available to suit a wide range of budgets and production capacities. Beyond manual hand cabinet blasting is suction- or pressure-style automated cabinet blasting. Rest assured that your local rocket scientist (ZERO distributor) can help you make the decision that's right for your application as well as your budget and production strategy.

Key Comparisons

Consideration	Suction Blast	Pressure Blast
Initial investment	Lower	Higher
Enclosure size	Smaller in relation to part size	Larger in relation to part size
Air consumption @ 80 psi & 3/8" nozzle	47.5 cfm	161 cfm
Impact on media recovery and dust collection	Lower capacities due to lower blast velocity	Higher capacity due to consequences of higher blast velocity; higher media fracture rate
Impact on labor	Less fatigue	More fatigue; more maintenance labor
Media	Best with medium to finer meshes	Most sizes except for very fine meshes
Maintenance	Lower	Higher
Production capacity	Basis for comparison	300% to 400% more than suction blasting